**Worksheet 1**
Page 1 of 3

**STEP 1** **Determine the applicable area (A) and the post-developed impervious cover ($I_{post}$).**

Applicable area (A)* = 7.90 acres

Post-development impervious cover:

structures = _____ acres

parking lot = _____ acres

roadway = _____ acres

other:

Impervious = 2.33 acres

_____ = _____ acres

Total = 2.33 acres

$I_{post}$ = (total post-development impervious cover ÷ A) × 100 = 29.49 %

* The area subject to the criteria may vary from locality to locality. Therefore, consult the locality for proper determination of this value.

**STEP 2** **Determine the average land cover condition ($I_{watershed}$) or the existing impervious cover ($I_{existing}$).**

Average land cover condition ($I_{watershed}$):
If the locality has determined land cover conditions for individual watersheds within its jurisdiction, use the watershed specific value determined by the locality as $I_{watershed}$.

$I_{watershed}$ = _____ %

Otherwise, use the Chesapeake Bay default value:

$I_{watershed}$ = (16%)





**Worksheet 1**
Page 2 of 3

Existing impervious cover ($I_{existing}$):

Determine the existing impervious cover of the development site if present.

Existing impervious cover:

structures = _____ acres

parking lot = _____ acres

roadway = _____ acres

other:

_____ = _____ acres

_____ = _____ acres

Total = 0 acres

$I_{existing}$ = (total existing impervious cover ÷ A*) × 100 = _____ %

* The area should be the same as used in STEP 1.

**STEP 3** **Determine the appropriate development situation.**

The site information determined in STEP 1 and STEP 2 provide enough information to determine the appropriate development situation under which the performance criteria will apply. Check (• ) the appropriate development situation as follows:

_____ **Situation 1**: This consists of land development where the existing percent impervious cover ($I_{existing}$) is less than or equal to the average land cover condition ($I_{watershed}$) and the proposed improvements will create a total percent impervious cover ($I_{post}$) which is less than or equal to the average land cover condition ($I_{watershed}$).

**$I_{post}$ _____ % • $I_{watershed}$ _____ %**





**Worksheet 1**
Page 3 of 3

V **Situation 2**: This consists of land development where the existing percent impervious cover ($I_{existing}$) is less than or equal to the average land cover condition ($I_{watershed}$) and the proposed improvements will create a total percent impervious cover ($I_{post}$) which is greater than the average land cover condition ($I_{watershed}$).

**$I_{existing}$ _____ % • $I_{watershed}$ 16.00 %; and**

**$I_{post}$ 29.49 % > $I_{watershed}$ 16.00 %**

_____ **Situation 3**: This consists of land development where the existing percent impervious cover ($I_{existing}$) is greater than the average land cover condition ($I_{watershed}$).

**$I_{existing}$ _____ % > $I_{watershed}$ _____ %**

_____ **Situation 4**: This consists of land development where the existing percent impervious cover ($I_{existing}$) is served by an existing stormwater management BMP(s) that addresses water quality.

**If the proposed development meets the criteria for development Situation 1, than the low density development is considered to be the BMP and no pollutant removal is required. The calculation procedure for Situation 1 stops here. If the proposed development meets the criteria for development Situations 2, 3, or 4, then proceed to STEP 4 on the appropriate worksheet.**





**Worksheet 2 : Situation 2**
Page 1 of 4

Summary of Situation 2 criteria: from calculation procedure **STEP 1** thru **STEP 3**, Worksheet 1:

**Applicable area (A)*** = 7.90 acres

$I_{post}$ = (total post-development impervious cover ÷ A) × 100 = 29.49 %

$I_{watershed}$ = _____ % **or** $I_{watershed}$ (16%)

$I_{existing}$ = (total existing impervious cover ÷ A*) × 100 = _____ %

**$I_{existing}$ _____ % • $I_{watershed}$ 16.00 %; and**

**$I_{post}$ 29.49 % > $I_{watershed}$ 16.00 %**

**STEP 4** **Determine the relative pre-development pollutant load ($L_{per}$).**

$L_{per(watershed)}$ = [0.05 + (0.009 × $I_{watershed}$)] × A × 2.28 **(Equation 5-16)**

where: $I_{post(watershed)}$ = relative pre-development total phosphorous load (pounds per year)
$I_{watershed}$ = average land cover condition for specific watershed or locality **or** the Chesapeake Bay default value of 16% (percent expressed in whole numbers)
A = applicable area (acres)

$L_{per(watershed)}$ = [0.05 + (0.009 × 16.00 )] × 7.90 × 2.28

= 3.49 pounds per year





**Worksheet 2 : Situation 2**
Page 2 of 4

**STEP 5** **Determine the relative post-development pollutant load ($L_{post}$).**

$L_{post}$ = [0.05 + (0.009 × $I_{post}$)] × A × 2.28 **(Equation 5-21)**

where: $L_{post}$ = relative post-development total phosphorous load (pounds per year)
$I_{post}$ = post-development percent impervious cover (percent expressed in whole numbers)
A = applicable area (acres)

$L_{post}$ = [0.05 + (0.009 × 29.49 )] × 7.90 × 2.28

= 5.68 pounds per year

**STEP 6** **Determine the relative pollutant removal requirement (RR).**

**RR** = $L_{post}$ • •$I_{post\,watershed}$)

**RR** 5.68 •• 3.49

= 2.19 pounds per year

**STEP 7** **Identify best management practice (BMP) for the site.**

1. Determine the required pollutant removal efficiency for the site:

**EFF** = ( RR ÷ $L_{post}$ ) × 100 **(Equation 5-22)**

where: EFF = required pollutant removal efficiency (percent expressed in whole numbers)
RR = pollutant removal requirement (pounds per year)
$L_{post}$ = relative post-development total phosphorous load (pounds per year)

**EFF** = ( 2.19 ÷ 5.68 ) × 100

= 38.56 %





**Worksheet 2 : Situation 2**
Page 3 of 4

2. Select BMP(s) from **Table 5-15** and locate on the site:

**BMP 1**: Upflow Bioretention Basin (Type A) : BMP4 Filtera B

**BMP 2**: Upflow Bioretention Basin (Type B) : BMP5 Filtera C

**BMP 3**: Filtera A : BMP6 Grate Inlet Skimmer

: BMP7 Upflow Bioretention Basin (Core)

3. Determine the pollutant load entering the proposed BMP(s):

$L_{BMP}$ = [0.05 + (0.009 × $I_{BMP}$)] × A × 2.28 **(Equation 5-23)**

where: $L_{BMP}$ = relative post-development total phosphorous load entering proposed BMP (pounds per year)
$I_{BMP}$ = post-development percent impervious cover of BMP drainage area (percent expressed in whole numbers)
A = drainage area of proposed BMP (acres)

$L_{BMP1}$ = [0.05 + (0.009 × 100 )] × 0.14 × 2.28

= 0.30 pounds per year

$L_{BMP2}$ = [0.05 + (0.009 × 100 )] × 0.26 × 2.28

= 0.56 pounds per year

$L_{BMP3}$ = [0.05 + (0.009 × 87.00 )] × 0.14 × 2.28

= 0.27 pounds per year

$L_{BMP4}$ = [0.05 + (0.009 × 74.00) × 0.12 × 2.28
= 0.20 lbs

$L_{BMP5}$ = [0.05 + (0.009 × 45.00) × 0.32 × 2.28
= 0.33 lbs

$L_{BMP6}$ = [0.05 + (0.009 × 65.00) × 0.86 × 2.28
= 1.25 lbs

$L_{BMP7}$ = [0.05 + 0.009 × 100) × 0.11 × 2.28
= 0.30 lbs





**Worksheet 2 : Situation 2**
Page 4 of 4

4. Calculate the pollutant load removed by the proposed BMP(s):

$L_{removed}$ = $Eff_{BMP}$ × $L_{BMP}$ **(Equation 5-24)**

where: $L_{removed}$ = Post-development pollutant load removed by proposed BMP (pounds per year)
$Eff_{BMP}$ = pollutant removal efficiency of BMP (expressed in decimal form)
$L_{BMP}$ = relative post-development total phosphorous load entering proposed BMP (pounds per year)

$L_{removed/BMP1}$ = 0.65 × 0.30 = 0.20 pounds per year

$L_{removed/BMP2}$ = 0.65 × 0.56 = 0.36 pounds per year

$L_{removed/BMP3}$ = 0.74 × 0.27 = 0.20 pounds per year

BMP4 0.74×0.20 = 0.15
BMP5 0.74×0.32 = 0.24
BMP6 0.74×1.25 = 2.89

BMP1 0.65 x 0.30 = 0.20

5. Calculate the total pollutant load removed by the BMP(s):

$L_{removed/total}$ = $L_{removed/BMP1}$ + $L_{removed/BMP2}$ + $L_{removed/BMP3}$ + . . . **(Equation 5-25)**

where: $L_{removed/total}$ = **total** pollutant load removed by proposed BMPs
$L_{removed/BMP1}$ = pollutant load removed by proposed BMP No. 1
$L_{removed/BMP2}$ = pollutant load removed by proposed BMP No. 2
$L_{removed/BMP3}$ = pollutant load removed by proposed BMP No. 3

$L_{removed/total}$ = 0.20 + 0.36 + 0.20 + 0.15 + 0.24 + 0.89 + 0.20

Σ = 2.24 pounds per year

6. Verify compliance:

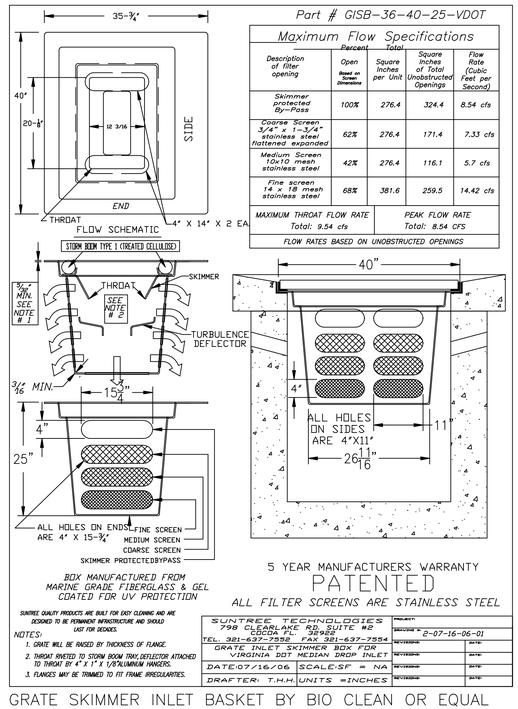
$L_{removed/total}$ • **RR**

2.24 ≥ 2.19

O.k



GRATE INLET SKIMMER DETAIL




SUNTREE QUALITY PRODUCTS ARE BUILT FOR EASY CLEANING AND ARE DESIGNED TO BE PERMANENT INFRASTRUCTURE AND SHOULD LAST FOR DECADES.

NOTES:
1. GRATE WILL BE RAISED BY THICKNESS OF FLANGE.
2. THROAT RIVETED TO STORM BOOM TRAY, DEFLECTOR ATTACHED TO THROAT BY 4" X 1" X 1/8" ALUMINUM HANGERS.
3. FLANGES MAY BE TRIMMED TO FIT FRAME IRREGULARITIES.

| | |
|---|---|
| SUNTREE TECHNOLOGIES 798 CLEARLAKE RD. SUITE #2 COCOA FL. 32922 | PROJECT: SEQUENCE # 8-07-16-06-01 |
| TEL. 321-637-7556 FAX 321-637-7554 | REVISIONS: DATE: |
| GRATE INLET SKIMMER BOX FOR VIRGINIA DOT MEDIAN DROP INLET | REVISIONS: DATE: |
| DATE:07/16/06 SCALE:SF = NA | REVISIONS: DATE: |
| DRAFTER: T.H.H. UNITS =INCHES | REVISIONS: DATE: |

GRATE SKIMMER INLET BASKET BY BIO CLEAN OR EQUAL

HUGHES GROUP ARCHITECTS
45640 WILLOW POND PLAZA
STERLING, VIRGINIA 20164
703.437.6600

CIVIL:
ALPHA CORPORATION
21351 Ridgetop Circle, Suite 200
Dulles, Va 20166
(703) 450-0800

STRUCTURAL:
EHLERT-BRYAN
1451 Dolley Madison Blvd. Suite 220
Mclean, VA. 22101
(703) 827-9552

MECHANICAL/ELECTRICAL:
BRINJAC ENGINEERING
4000 Albermarle Street, NW
Washington, DC 20016
(202) 237-2750

# PURCELLVILLE FIRE AND RESCUE

500 NORTH MAPLE AVENUE
PURCELLVILLE, VIRGINIA

WATER QUALITY CALCULATIONS

KEY PLAN

N

REVISIONS:

ISSUES:
09-26-07 BID SET

STAMP AND SEAL:

DATE: 09-26-07
SCALE: AS NOTED

PROJECT NO. 0611

SHEET: C-124